

WHAT IS CLAIMED IS:

1. An harmonic article identification tag, comprising:
at least one RF diode carried by an article and responsive to at least two RF signals to generate a third harmonic intermodulation output.
- 5 2. The harmonic article identification tag as in Claim 1 wherein the at least one RF diode comprises a signature identification of the article carrying the at least one RF diode.
- 10 3. The harmonic article identification tag as in Claim 1 wherein the at least one diode generates harmonic signal characteristics for RF article identification.
- 15 4. The harmonic article identification tag as in Claim 1 wherein the at least one diode responds to RF signals in a frequency range from about 24.0 GHz to about 24.1 GHz.

5. An harmonic article identification system, comprising:
at least one semiconductor device carried by an article and responsive to at
least two RF signals to generate an harmonic intermodulation output;
an antenna receiving an harmonic intermodulation output and generating an
5 analyzer signal; and
a signal analyzer coupled to the antenna and responsive to the analyzer signal
to identify the article carrying the at least one semiconductor device.

6. The harmonic article identification system as in Claim 5 wherein the at
10 least one semiconductor device comprises at least one RF diode.

7. The harmonic article identification system as in Claim 6 wherein the at
least one diode responds to RF signals in a frequency range from about 24.0 GHz to
about 24.1 GHz.

8. The harmonic article identification system as in Claim 5 wherein the
antenna comprises a dipole having a length of one wavelength at one of the at least
two RF signals.

9. The harmonic article identification system as in Claim 5 wherein the at
20 least one semiconductor device comprises a signature identification of the article
carrying the at least one semiconductor device.

10. An harmonic article identification system, comprising:
a first signal generator operating to generate an RF signal at a first frequency;
a second signal generator operating to generate an RF signal at a second frequency;

5 at least one RF diode carried by an article and responsive to the first and second frequencies to generate an harmonic intermodulation output;
an antenna receiving the harmonic intermodulation output and generating an analyzer signal; and
a signal analyzer coupled to the antenna and responsive to the analyzer signal
10 to identify the article carrying the at least one RF diode.

11. The harmonic article identification system as in Claim 10 wherein the signal analyzer responds to the analyzer signal by subtraction of the first frequency signal from the second frequency signal.

12. The harmonic article identification system as in Claim 10 wherein the signal analyzer responds to the analyzer signal in accordance with the expression:

$$2F_1 - F_2,$$

wherein:

20 F₁ equals the first frequency, and
F₂ equals the second frequency.

13. The harmonic article identification system as in Claim 10 wherein the signal analyzer responds to the analyzer signal by subtraction of the second frequency signal from the first frequency signal.

14. The harmonic article identification system as in Claim 10 wherein the signal analyzer responds to the analyzer signal in accordance with the expression:

$$2F_2 - F_1,$$

30 wherein:

F₁ is the first frequency, and
F₂ is the second frequency.

15. The harmonic article identification system as in Claim 10 wherein the at least one RF diode comprises a signature identification of the article carrying the at least one RF diode.

5

16. The harmonic article identification system as in Claim 10 wherein the at least one RF diode responds to RF signals in a frequency range from about 24.0 GHz to about 24.1 GHz.

10

17. The harmonic article identification system as in Claim 10 wherein the antenna comprises a dipole having a wavelength determined by either the first frequency or the second frequency.

064749.0139

18. A method for harmonic article identification, comprising:
generating at least two RF signals at separate frequencies;
generating an harmonic intermodulation signal by at least one RF diode
carried by an article and responsive to the at least two RF signals;
5 generating an analyzer signal from an antenna receiving the third harmonic
intermodulation output; and
generating an article identification signature by analyzing the analyzer signal
from the antenna.

10 19. The method for harmonic article identification as in Claim 18 further
comprising storing the article signature for subsequent identification of the article.

20. The method for harmonic article identification as in Claim 19 further
comprising scanning the stored article signatures for identification of an article.

15 21. The method for harmonic article identification as in Claim 20 further
comprising generating an article identification in response to scanning the stored
article signatures.

22. An harmonic article identification system, comprising:
- a first signal generator outputting an RF signal at a frequency of 24.0 GHZ;
 - a second signal generator outputting an RF signal at a frequency of 24.1 GHZ;
 - at least one RF diode carried by an article and responsive to the 24.0 GHZ
- 5 frequency and the 24.1 GHZ frequency to generate a third harmonic intermodulation output;
- a dipole antenna receiving the third harmonic intermodulation output and generating an analyzer signal; and
 - a signal analyzer coupled to the dipole antenna and responsive to the analyzer
- 10 signal to identify the article carrying the at least one RF diode in accordance with the expression:
- $2F1 - F2$,
- wherein:
- F1 equals the 24.0 GHZ frequency, and
 - 15 F2 equals the 24.1 GHZ frequency.

23. An harmonic article identification system, comprising:
- a first signal generator outputting an RF signal at a frequency of 24.0 GHZ;
 - a second signal generator outputting an RF signal at a frequency of 24.1 GHZ;
 - at least one RF diode carried by an article and responsive to the 24.0 GHZ
- 5 frequency and the 24.1 GHZ frequency to generate a third harmonic intermodulation output;
- a dipole antenna receiving or any other tuned antenna receiving the third RF harmonic intermodulation output and generating an analyzer signal; and
 - a signal analyzer coupled to the dipole antenna and responsive to the analyzer
- 10 signal to identify the article carrying the at least one RF diode in accordance with the expression:
- $$2F2 - F1,$$
- wherein:
- F1 equals the 24.0 GHZ frequency, and
 - 15 F2 equals the 24.1 GHZ frequency.

24. An identification system for articles carrying at least one semiconductor device generating an harmonic intermodulation output, comprising:

a spectrum analyzer responsive to an harmonic intermodulation output generated by at least one semiconductor device carried by an article, the spectrum
5 analyzer generating an identification signal;

a signature memory storing the identification signatures of at least one article for identification;

a comparator responsive to the identification signal of the spectrum analyzer and coupled to receive the identification signatures of at least one article for
10 identification from the signature memory, the comparator generating an output identifying an article carrying at least one semiconductor device from the stored identification signatures.

25. An identification system as in Claim 24 further comprising an antenna
15 receiving the harmonic intermodulation output generated by the at least one semiconductor device carried by an article and generating an analyzer signal, the spectrum analyzer responsive to the analyzer signal to generate the identification signal.

26. The identification system as in Claim 25 wherein the antenna
20 comprises a dipole having a length of one wavelength at one of at least two RF signals.

27. The identification system as in Claim 24 further comprising a display
25 responsive to the signal generated by the comparator to indicate identification of an article.

28. The identification system as in Claim 24 further comprising:

a first signal generator operating to generate an RF signal at a first frequency;

30 a second signal generator operating to generate an RF signal at a second frequency signal; and

wherein the at least one semiconductor device carried by the article responds to the first and second frequencies to generate the harmonic intermodulation output.

29. The identification system as in Claim 28 further comprising an antenna
5 receiving the harmonic intermodulation output from the article carrying the at least one semiconductor device and generating an analyzer signal; and

wherein the spectrum analyzer responds to the analyzer signal to generate an identification signal.

10 30. The identification system as in Claim 29 wherein the antenna comprises a dipole having a length of one wavelength at either the first frequency or the second frequency.

31. A method for harmonic article identification, comprising:
generating at least two RF signals at separate frequencies;
radiating at least one semiconductor device carried by an article for
identification;

5 generating an harmonic intermodulation signal by the at least one
semiconductor device carried by the article and radiated with the at least two RF
signals;

generating an analyzer signal from an antenna receiving the harmonic
intermodulation output;

10 comparing the analyzer signal with one or more stored identification
signatures, the comparator generating a signal to identify the article carrying the at
least one semiconductor device from the stored identification signatures.

32. The method for harmonic article identification as in Claim 31 further
15 comprising storing the identification signatures for subsequent comparison with
analyzer signals.

33. The method for harmonic article identification as in Claim 32 wherein
comparing the analyzer signal with identification signatures comprises:

20 scanning the stored signatures for comparison with the generated analyzer
signal; and

generating an article identification signal in response to a comparison between
one of the stored identification signatures and the analyzer signal.

25